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MARKETING
EGGS



THE EGG

Quality is the great factor in market value.

A good market egg requires—

Good production methods on the farm.

Good handling methods during its journey to market.

Speed of movement from the nest to the consumer.

The best method of marketing for each producer depends upon—

Volume of egg production.

Proximity to consuming centers.

Shipping facilities.

Cost of transportation service.

Available buying or marketing agencies.

Time and labor costs required in preparation and delivery.

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MARKETING EGGS

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MORE THAN five million farms in the United States produce eggs, including a large majority of the farms in every State. On most of these farms egg production is a side line, and the surplus available for market is small, but the total surplus of these farms is sufficient to supply the needs of an urban population of more than 54,000,000 people.

The number and value of chicken eggs produced on farms in the United States in 1924 were as follows:

Chicken eggs	dozen	1,913,245,129
Value of chicken eggs	dollars	571,938,492

WHERE EGGS ARE PRODUCED

Specialized poultry farms, on which the production of market eggs is the chief activity, are much less numerous than are farms with general farm flocks. Specialized egg farms are located in greatest numbers along the Atlantic coast, in close proximity to the great consuming centers, and along the Pacific coast, where climatic conditions are especially favorable. They are found in smaller numbers close to large cities and scattered generally throughout all of the United States. Because of the smaller number of such farms, the total egg production of specialized poultry farms is much lower than that of general farms. (Fig. 1.)

There are areas of intensive egg production in the East and on the Pacific coast but the greater supply is produced in the eastern North-Central and western North-Central States. According to the census for 1924, Iowa led with an annual production of 133,776,386 dozen, followed in order by Missouri, Illinois, Ohio, Pennsylvania, California, Kansas, New York, Indiana, and Minnesota. Not only do the Middle Western States produce more eggs, but because of a smaller urban population they have a greater surplus for shipment

to eastern markets. The origin of eggs received in the New York, Chicago, Philadelphia, Boston, and San Francisco markets, shown in Table 1, clearly indicates the importance of each State as a surplus producer of eggs.

TABLE 1.—*Number of cases of eggs received at the five principal markets from different States during 1926*

[A carload of eggs consists of approximately 400 cases]

Origin	Cases of eggs received in—					
	New York	Chicago	Philadelphia	Boston	San Francisco	Total
Alabama	2,071	27	703	9	0	2,810
Arkansas	22,593	22,829	3,200	11,189	0	59,811
California	438,856	66,302	13,246	23,600	709,840	1,251,844
Colorado	6,052	25,736	0	768	0	32,556
Connecticut	2,498	0	0	1,056	0	3,554
Delaware	80,330	0	23,449	10	0	103,789
Georgia	812	0	0	0	0	812
Idaho	10,884	6,573	6,623	1,280	10,411	35,771
Illinois	939,420	147,698	189,470	326,693	0	1,603,281
Indiana	542,392	9,457	112,510	163,133	0	827,492
Iowa	1,101,545	874,796	104,939	269,543	0	2,350,823
Kansas	237,346	403,446	68,160	182,046	0	890,998
Kentucky	69,032	3,948	19,693	1,748	0	94,421
Louisiana	30	7	0	1	0	38
Maine	96	0	960	82,131	0	83,187
Maryland	117,612	0	37,898	151	0	155,661
Massachusetts	8,257	0	2,218	6,705	0	17,180
Michigan	55,686	13,030	112,904	40,811	0	222,431
Minnesota	200,696	618,490	103,752	228,802	0	1,151,740
Mississippi	3,509	114	19,575	400	0	23,598
Missouri	351,067	655,440	259,953	134,492	0	1,400,952
Montana	715	2,334	22	1,009	1,378	5,458
Nebraska	55,199	463,898	45,717	90,940	0	655,754
Nevada	0	0	0	0	192	192
New Hampshire	252	0	0	22,073	0	22,325
New Jersey	212,570	0	2,311	1	0	214,882
New York	637,314	10	18,950	31,314	0	687,588
North Carolina	1,759	0	2,966	0	0	4,725
North Dakota	2,643	52,913	2,180	11,206	0	68,942
Ohio	394,466	791	100,412	51,981	0	547,650
Oklahoma	23,209	70,457	13,435	6,408	0	113,509
Oregon	54,475	7,606	1,512	2,010	16,013	81,616
Pennsylvania	239,812	293	109,236	4,309	0	353,650
Rhode Island	55	0	0	1,213	0	1,268
South Dakota	42,763	513,821	5,529	22,880	0	584,993
Tennessee	119,642	7,368	14,993	1,203	0	143,206
Texas	23,049	12,565	4,680	1,121	0	41,415
Utah	66,741	1,080	0	0	0	67,821
Vermont	2,607	0	0	18,068	0	20,765
Virginia	79,917	0	98,868	802	0	179,587
Washington	543,399	61,373	3,528	4,642	5,826	618,668
West Virginia	5,007	0	9,491	17	0	14,515
Wisconsin	77,724	485,475	53,237	61,618	0	678,054
Wyoming	1	4	0	477	0	482
Parcel post	42,588	47,507	0	0	0	90,045
District of Columbia	279	0	50	0	0	329
Canada	506	2	0	70	0	578
Miscellaneous ¹	603	0	0	0	0	603
Total	6,818,119	4,575,390	1,566,370	1,807,830	743,660	15,511,369

¹ Under miscellaneous are included small daily shipments received from different States.

The smaller cities obtain their supply of eggs in large part from the producing territory immediately surrounding them, but the larger cities must draw most of their needed supply from more remote producing sections. The larger the city and the more extensive the suburban population, the greater becomes the problem of obtaining a supply and the greater the necessity for securing a part of the supply at greater distances.

Most of the surplus eggs produced in New York, New Jersey, and Pennsylvania are sent to New York City, but the quantity shipped to that market from these States is only about 16 per cent of the total supply. A much greater portion comes from the Middle West, about an equal quantity comes from the Pacific coast, and a smaller quantity comes from the Southern States.

THE PROBLEM OF TRANSPORTATION

When eggs are produced by small flocks, in sections located a long distance from market, it is necessary that they be assembled and packed properly in large lots for economical handling and shipment. Thus the business of the egg buyer and shipper has become necessary.

The egg is a delicate, fragile food product. Under unfavorable conditions it is subject to rapid deterioration. Moreover, shipments to the large eastern markets from the Middle Western States, where the greater number of eggs are produced, must travel an average of

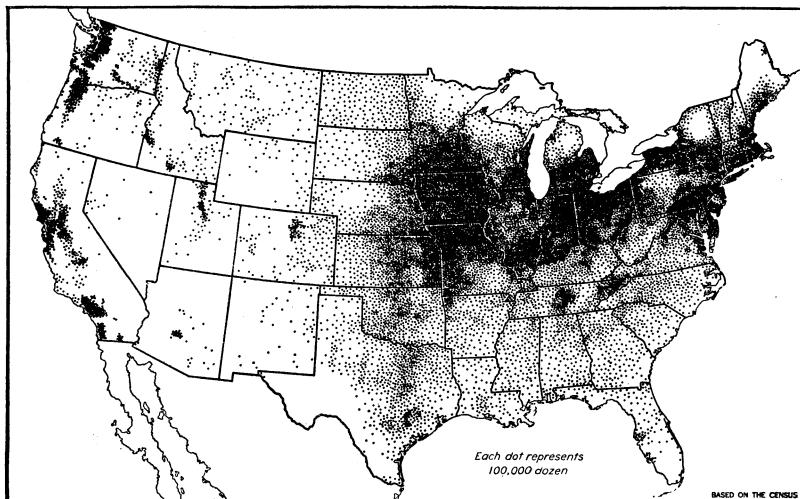


FIG. 1.—Eggs produced in 1924. Egg production is widely distributed, and the commercial receipts are gathered from many States

more than 1,000 miles. This indicates the need for refrigerator cars for shipping the eggs and suggests the general scope and complexity of the transportation problems involved. The Interstate Commerce Commission reported that in 1926 over 55,400 cars of eggs originated on Class I railroads of the United States.

SEASONAL PRODUCTION

If eggs were produced at an even rate throughout the entire year, the supply would be uniform and continuous and the problem of marketing would be much simplified. But the production is highest during the spring and early summer months and gradually declines during the fall, until it reaches its low point in November and December. This is well illustrated in Figures 2 and 3 by the receipts of eggs at the five markets.

THE FUNCTION OF COLD STORAGE

The uneven seasonal production results in a surplus during the spring season and a corresponding scarcity during the fall and winter. It is one of the functions of the wholesale egg trade to equalize the supply and meet the demand at all seasons as nearly as possible. This is done by moving part of the spring eggs through the usual channels for immediate consumption while the rest are carefully candled, packed in new cases with new fillers and flats, and placed in cold storage, where they are held until fall and winter when there is a shortage of fresh eggs. Eggs specially packed for storage in new cases made of odorless white wood, with new fillers and flats, are called "storage packed" and sell for slightly higher prices per dozen than do those packed in other ways.

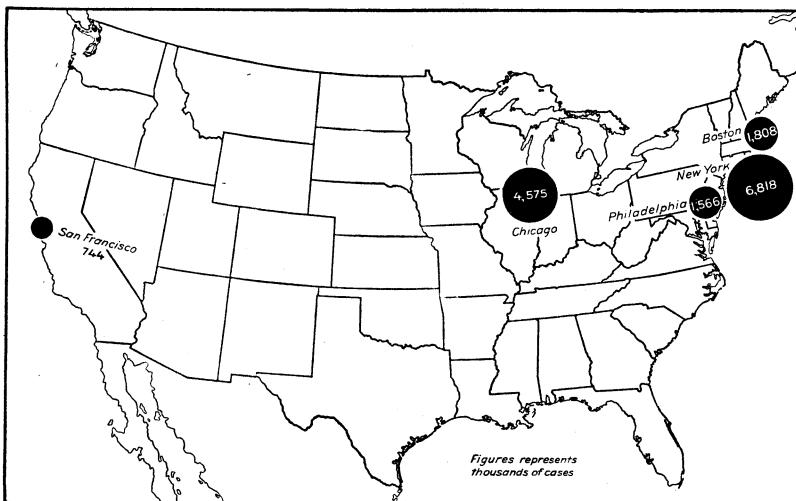


FIG. 2.—Receipts of eggs at five markets, 1926. Receipts of eggs at the principal markets give some indication of the leading centers of consumption

In the past, approximately 12 to 15 per cent of the total annual production of eggs has been stored. With present improved poultry practice and the consequent greater winter egg production, it is doubtful if it will be necessary to store as large a percentage of the annual egg crop in the future. The season of storage begins in March, is most active during April and May, continues at a lessened rate during June and July, and closes about August 1. Withdrawal of eggs from storage is slight in August, but gradually increases in September and October, is heaviest in November and December, and continues through January and February until the stocks are practically exhausted by March 1 or earlier. (Fig. 4.)

Reports of the cold storage holdings of eggs for the United States as of the first of each month are released about the twelfth of the following month by the United States Department of Agriculture. Reports of the holdings in ten of the principal markets are available daily and reports of the holdings in twenty-six cities, weekly. The

holdings in the twenty-six cities,¹ except when very small in quantity, show a rather regular relationship to the total United States holdings and can be used successfully to estimate the total United States holdings, as of the first of each month before the latter figures become available. (Fig. 4.)

The holding of eggs in cold storage is a legitimate and needed market function which benefits both producers and consumers. Without cold storage, eggs would hardly be worth enough in the spring, in many localities, to make it worth while to gather them; in the fall the supply would be far from sufficient to meet the demand, and the price would be so high as to be prohibitive to most consumers. Through the storage of eggs there is a demand in the spring for the surplus, resulting in attractive prices to the producers; in the fall and winter a large supply of wholesome storage eggs is made

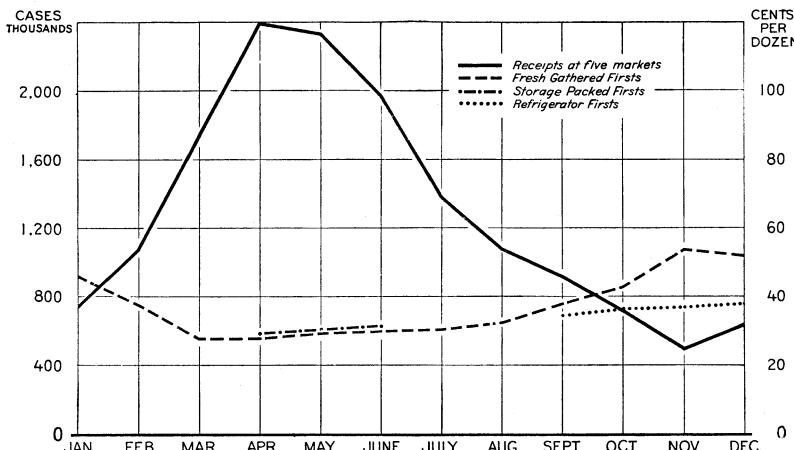


FIG. 3.—Wholesale price of eggs at New York and receipts at five markets, average, January, 1924-December, 1926. The price of eggs rises as receipts decrease and falls as receipts increase. Storage-packed eggs bring a slightly higher price because of the better packing. The price of refrigerator eggs rises with the price of fresh eggs, but to a lesser extent

available at prices within the reach of consumers, yet the demand for new-laid eggs is sufficient to maintain a price on them at a level which makes winter-egg production profitable.

MARKETING METHODS

The marketing methods employed between producer and consumer may be relatively simple or they may be decidedly complex. The care, handling, and promptitude associated with each method has a decided effect upon the quality of the eggs, upon the satisfaction which they afford the consumer, and upon the price paid to the producer.

Egg-marketing methods may be divided into three groups—direct, indirect, and intermediate. Direct marketing is the sale of eggs by the producer to the consumer. Indirect marketing is the sale of eggs by the producer to various agencies which in turn sell to packers or

¹ New York, Chicago, Philadelphia, Boston, Providence, Buffalo, Syracuse, Cuba, N. Y., Lowell, N. Y., Pittsburgh, Cleveland, Detroit, Minneapolis, St. Paul, Milwaukee, Plymouth, Marshfield, Green Bay, Wis., Denver, Kansas City, St. Louis, Omaha, Portland, Seattle, San Francisco, and Los Angeles.

concentrators. By this method the eggs pass through a series of agencies and may be in trade channels for several weeks or longer before they reach the consumer. Intermediate marketing is a method by which the producer sells to dealers in the consuming market, the eggs passing through the hands of one or more dealers before they reach the consumer. (Fig. 5.)

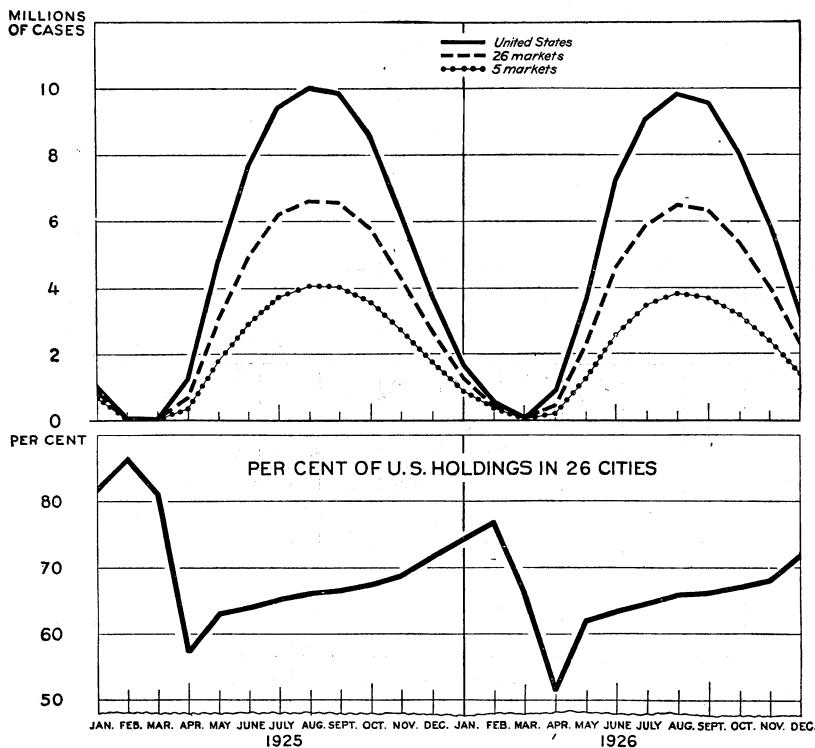


FIG. 4.—Cold-storage holdings of eggs. Cold-storage holdings of eggs (1) in the United States, (2) in the 5 largest markets, and (3) in 26 markets, with the percentage of total United States holdings in the 26 markets, 1925 and 1926. Stocks of eggs normally begin to accumulate in storage in March, increase rapidly in April and May, increase more slowly in June and July, and reach their high point about August 1

MARKET CHANNELS

PRODUCER TO CONSUMER

As a rule, direct marketing from the producer to the consumer involves a considerable number of small sales at the best prices obtainable, and its continuance depends upon the delivery of a product of high quality. The question of whether the producer can afford to employ direct-marketing methods depends upon his proximity to a consuming market and upon the time and expense entailed in establishing and maintaining a trade for all or for a goodly portion of his product. To deliver eggs to the consumer the producer may make use of the parcel post, establish an egg route, deliver his own produce, operate a roadside market, or depend upon sales at his own door.

PRODUCER TO RETAILER OR HOTEL

Producers frequently sell to retailers or to hotel, restaurant, and soda-fountain trade. The prices received are often nearly as good as for deliveries direct to the consumer, and this method has the advantage of fewer deliveries with a larger volume in each. It is therefore a less expensive method of selling than is direct to consumers. Deliveries to this trade are made by automobile truck, parcel post, or express shipments.

PRODUCER TO WHOLESALE DEALER

A large number of producers sell their eggs to jobbers or wholesale dealers, shipping one or more cases into the market by express.

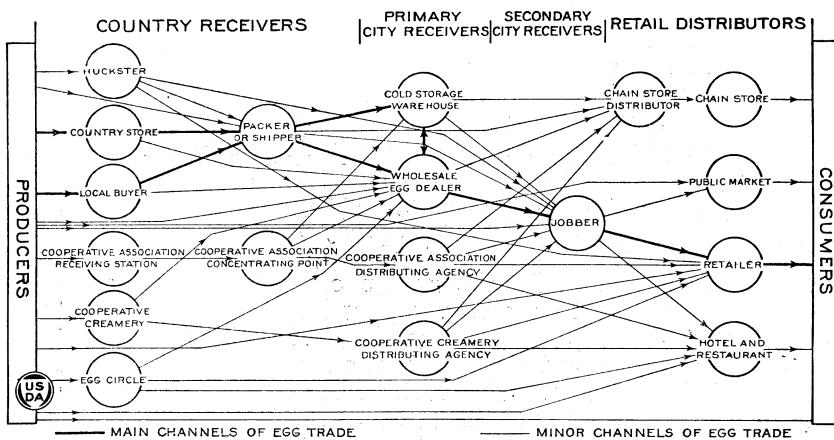


FIG. 5.—Eggs reach their final market through numerous channels

Such a method of sale requires considerably less effort for the producer, as he does not have to establish and maintain contacts with the consuming trade. On the other hand the return is somewhat less. When contact has been established with a reliable dealer this method of marketing is often very satisfactory.

COOPERATIVE MARKETING

In certain sections of the country egg producers have formed cooperative marketing agencies, either because of the unsatisfactory prices which they have received, or because of an overstocked local market and the necessity of disposing of their surplus in distant markets. The smallest local cooperative marketing enterprise is the egg circle. In forming one of these circles several producers associate themselves together, and pool their eggs for shipment to a common market, usually in small lots by express. Another plan of cooperative egg marketing consists of the utilization of the local cooperative creamery as a means of obtaining an outlet. As the farmers are already marketing their milk or cream through the creamery, it is comparatively easy for them to deliver their eggs at the same place and at the same time.

In certain sections, however, special marketing associations have been formed which handle the produce of a large number of producers. The eggs are generally collected at local receiving stations, from which they are taken to the packing plant, where they are carefully graded and shipped to market in car lots under refrigeration. The cooperative poultry and egg-marketing associations of the Pacific coast are excellent examples of the successful operation of such a plan.

THE COUNTRY STOREKEEPER AND THE EGG PACKER

A majority of the commercial market eggs are produced on general farms in the Middle West. To a large extent these eggs are marketed through the country car-lot packer and shipper. This process involves the passage of the eggs through a relatively large number of hands. The farmer may take his surplus eggs to town when it is convenient and sell them to a local merchant for trade, or to a local egg buyer for cash. In some sections hucksters with trucks go through the country and purchase eggs at the farmer's door.

The custom prevalent among hucksters and local merchants in many sections of the Middle West, of buying eggs on the "case count" basis is a practice most damaging to quality. When eggs are bought on this basis, payment is made solely on the number of dozens of eggs delivered, without regard to their quality or the percentage that are good or bad. Such a system offers no incentive to the careful farmer to produce good eggs, for he receives no more than does the man who produces poor eggs. In the last few years there has been a decided tendency to substitute for the "case count" basis of buying, a "loss-off" basis. Under the "loss-off" basis no payment is made for eggs that are unwholesome and unfit for food, and a difference, based on quality, may be made in the price paid for the good eggs. In some States laws have been enacted which regulate egg buying and require that a "loss-off" basis be used.

The country merchant or storekeeper and the local egg buyer ship the eggs to car-lot packers or shippers or to less-than-car-lot receivers in the market. A considerable time often elapses before these eggs are shipped, and the conditions under which they are kept are often so unfavorable that a distinct deterioration in quality occurs. When eggs are received by a car-lot packer and shipper who uses modern equipment they are immediately placed in refrigerated rooms where the temperature is between 35° and 40° F. and held there until they are thoroughly cooled. Some of the smaller shippers are not so well equipped, and the eggs may not be handled so well, but they are candled, graded, repacked, and shipped by refrigerated fast freight or express, either in car lots or in less-than-car lots, to a large market where they go into consumptive channels immediately or are placed in storage for future sale. In the large markets the eggs are distributed by the receiver to retailers or to jobbers who, in turn, sell them to retailers.

When eggs are marketed through this channel, considerable time may elapse between the time the egg is laid and the time it reaches

the consumer. Usually it takes three weeks, and in some cases considerably longer, especially when the eggs are held in cold storage for future sale.

EXCHANGE TRADING IN EGGS

In most large egg markets (in practically all of the larger cities), exchange organizations composed of wholesale dealers have formulated rules that govern the trading in eggs and other commodities by their members. These exchanges maintain premises where wholesale trading may take place on each business day. In some cases, the prices at which sales are consummated, at which sellers offer goods and buyers bid for them, constitute the basis on which market quotations are established. In other cases, the sales, bids, and offers are taken into consideration, along with "street" sales or sales made outside the exchange, in arriving at market quotations.

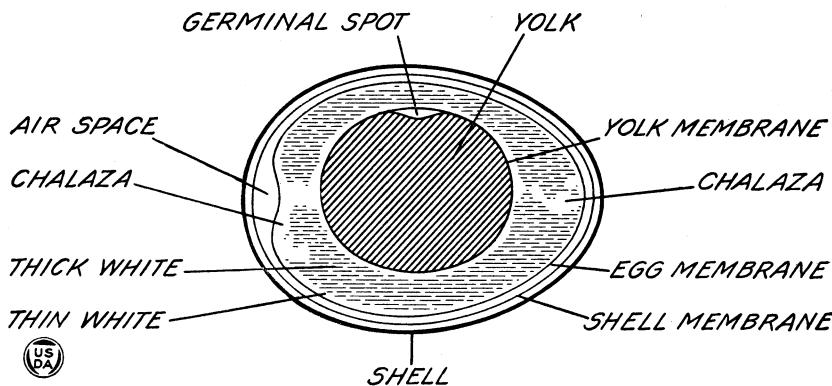


FIG. 6.—The parts of an egg

EGG STRUCTURE AND COMPOSITION

To understand the conditions or factors that may affect the quality of eggs their structure and composition should be reviewed. (Fig. 6.) The yolk is suspended in the white at approximately the center of the egg and is surrounded by the vitelline membrane. On the surface of the yolk, and always on its upper side, appears the germ or germinal spot. In some cases there may be more than one. In an infertile egg this germ spot is small and irregular in shape; in a fresh fertile egg it is round and larger. It is this germ which, in a fertile egg, develops into the embryo. The size of the germ spot therefore varies, depending upon the extent to which this development has taken place.

The white consists of albuminous material which fills the space between the yolk and shell. It varies in density, being thickest in the portion near the yolk and thinnest in the portion next to the shell membrane. The white is clear and transparent except for two cloudy-white thickened portions, resembling twisted cords, which adhere to the yolk at the points nearest the ends of the egg. These cords, called chalazae, allow the yolk to rotate freely as the egg is turned but serve to retard the rise or settling of the yolk toward the shell when the egg is left in one position for any length of time.

The shell is composed largely of lime. As it is porous in structure, it allows the evaporation of water from the egg contents, the penetration of odors and flavors from without, and, under unfavorable environment, the entrance of bacteria. Immediately lining the shell are two shell membranes which serve as a secondary protection to the contents. When the egg is first laid and is still warm, the contents entirely fill the shell. As the egg cools and the contents shrink a small air cell is found between the two shell membranes, usually at the large end, where these membranes separate most easily. Evaporation of the contents takes place with the aging of the egg, and the air cell gradually grows larger. (Fig. 6.)

In the hen egg, the shell comprises about 11 per cent, the white about 57 per cent, and the yolk about 32 per cent of the entire weight. The composition of the egg, of the egg white, and of the egg yolk are given in Table 2. The eggs of other classes of poultry differ somewhat from hen eggs in their composition, but this difference is small.

TABLE 2.—*Composition of the hen egg*¹

	Refuse (mainly shell)	Water	Protein	Fat	Ash	Total ²
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Whole egg	11.2	65.5	11.9	9.3	0.9	98.8
Whole egg (edible portion)		73.7	13.4	10.5	1.0	98.6
Egg white		86.2	12.3	.2	.6	99.3
Egg yolk		49.5	15.7	33.3	1.1	99.6

¹ LANGWORTHY, C. F., EGGS AND THEIR VALUE AS FOOD. U. S. Dept. Agr. Bull. 471, 29 p., illus., 1927.

² The difference between these total percentages and 100 is made up of undetermined substances.

FACTORS AFFECTING QUALITY

Eggs are a delicate and perishable food product, subject to rapid deterioration, susceptible to unfavorable surroundings, and liable to injury or loss by breakage. Therefore if eggs are to reach the consumer in good edible condition, and if the enormous waste which now occurs because of deterioration and spoilage is to be diminished, they must receive intelligent care and handling from the time they are laid until they are eaten, and the whole marketing process must be expedited as much as possible.

Quality is determined by five primary factors—condition of the shell, condition of the air cell, condition of the yolk, condition of the white, and condition of the germ. As all of these factors except the shell have to do with the interior of the egg, their condition must be determined by candling.

SHELL

In eggs of first quality the shell must be strong, sound (free from any cracks or checks), regular (free from abnormalities of structure or mottling which may cause weakness), and must be clean. Strength and soundness are necessary to insure good shipping and good keeping quality. Cleanliness affects both price and keeping quality, because dirty eggs spoil more rapidly than do clean eggs.

AIR CELL

The air cell develops at the large end of the egg by separating the two shell membranes and filling this space with air. In eggs of best quality the air cell must be small, not over one-eighth of an inch in depth, measured from the end of the shell to the plane passing through the egg at the lower edge of the air cell where it touches the shell. The air cell should occupy a fixed position and not be movable. Large air cells are an indication of staleness or age; movable air cells indicate broken membranes and detachment of the chalazae, permitting the yolk to settle and to stick to the shell.

YOLK

The yolk of a fresh egg should be only dimly visible as a shadow when the egg is turned before the candle. It should have limited freedom of motion. Rapid and freer motion and greater visibility of the yolk is associated with lower quality. When broken out in a dish the yolk of a fresh egg is well rounded or "stands up" well; the yolk of a stale egg is flatter and more spread out. The color of the yolk may vary all the way from a pale to a deep yellow. The color depends largely upon the amount of green feed which the hens have received, and therefore varies to a considerable extent with the season.

The color of the yolk may affect the price to a limited extent, especially where some special demand is to be met. Most consumers prefer a fairly deep-colored yolk, but there is a special demand in the New York City market for eggs with pale yolks.

WHITE

The white of an egg of extra quality should be firm and clear. Weak or thin white indicates staleness, and bloody white, or the presence of any foreign substance, such as a blood clot or meat spot, reduces or destroys the market value.

GERM SPOT

In a fresh egg the germ should show no visible development before the candle, and even when the egg is broken out the germ spot should show little or no development. In fertile eggs subjected to a temperature of 72° F. or over, the development of the germ will proceed and the size of the spot may reach one-third of an inch in diameter or even larger before any blood is shown. As soon as blood shows the egg is no longer edible. The development of the germ spot before this point is reached affects the quality adversely in proportion to such development.

SECONDARY FACTORS

In addition to the primary quality factors mentioned, there are three secondary factors which affect quality, namely, color of shell, size, and weight. These factors may be determined without candling; they do not affect the wholesomeness of the egg, but may affect its market price. Whether or not the shade of color will affect the price depends upon the market to which the eggs are consigned.

For example, fancy eggs command a premium in the New York market if they are pure white in color, whereas fancy browns command a premium on the Boston market. On any market it is important that a lot of eggs be uniform in color; that is, all brown or all white, rather than brown and white mixed. A mixture of colors affects the appearance of the eggs as a lot and usually affects the price.

Uniformity in size also affects market price because a lot of uniform size presents a more pleasing appearance. Mixing small-sized eggs with normal-sized eggs is sure to detract from the market value. The small eggs should be sorted out and used at home or marketed separately. Unusually large eggs marketed in standard packages are very likely to break. If broken they are not only a loss in themselves but they smear and damage the other eggs.

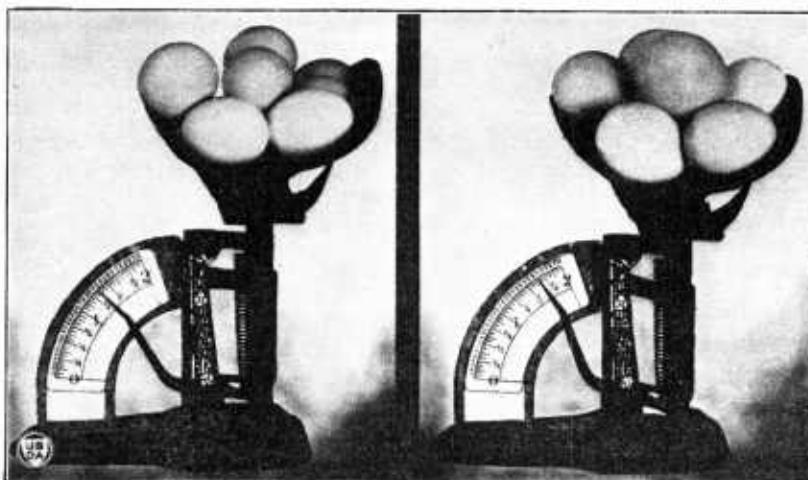


FIG. 7.—The food value of eggs varies in direct proportion to their weight. The dozen eggs on the left weigh $21\frac{1}{2}$ ounces, the dozen on the right $26\frac{3}{4}$ ounces. Their quality is the same. Should they be sold at the same price?

Weight is a factor which affects prices. Official market grades usually specify minimum net weights per case. Since the food value of a dozen eggs is directly proportionate to their weight, it is obvious that weight should be a more important factor in deciding upon prices than it is at present, especially in retail sales. (Fig. 7.)

Besides meeting the standards already enumerated, eggs should be free from any abnormal flavor or odor. The most common abnormal flavors are sourness and mustiness. Foreign flavors may be absorbed from any strong-smelling material which may be kept near the eggs. It is impossible to detect these defects before the eggs are used, but care should be taken to prevent their occurrence by keeping the eggs under good conditions. Storage flavor is a common characteristic of undergrade eggs that have been held in storage and of eggs that have been held under improper storage conditions.

FARM CARE ESSENTIAL TO GOOD QUALITY

Practically all eggs are of equally good quality when first laid. But if they are to retain their quality and reach the market in good condition they must be properly cared for and handled by the producers. There is no process in marketing which can improve an egg of poor quality. All that can be done is to preserve the original quality. Good care on the farm is therefore a necessary prerequisite to the marketing of good eggs.

First of all it is necessary to have good poultry stock of a standard variety in order to produce eggs of uniform size and color. The flock must be well-housed, fed, and cared for in order to increase productivity. As soon as the hatching season is over, all male birds should be disposed of, or separated from the flock, so that only infertile eggs of superior keeping quality will be produced. Nests, clean and sufficient in number, must be provided in order that the largest possible percentage of the eggs may be kept clean. Dirty eggs should never be washed unless they are to go into channels of immediate consumption. Washing reduces the keeping quality and results in losses, especially if the eggs are to be placed in storage.

Eggs must be gathered frequently, at least once a day. During very hot or very cold weather it is preferable to gather them twice a day to prevent the eggs from becoming heated or frozen. They should be kept in a cool, moderately dry place to maintain their quality and to prevent mold development. All very small, very large, or very dirty eggs should be used at home or sold to local consumers. They should not be included with those shipped to market.

CANDLING

To determine the quality of eggs as shown by the condition of the air cell, yolk, white, and germ, it is necessary to candle them. Candling consists of holding the egg before a strong light, usually artificial, in such a way that the rays of light penetrate the egg to a considerable extent, thus enabling the condition of the contents to be noted. Most producers do not candle eggs, although buyers and dealers find it advantageous to do so. Where a high-class retail trade is being catered to, candling by producers is a desirable and a necessary step, for sometimes absolutely fresh, new-laid eggs are unsuitable for food and if delivered will hurt the reputation of the producer. Such eggs are those with bloody whites, blood spots, and meat spots.

Candling should be practiced more generally by producers. If done daily, it is a short process on the average farm and will eliminate any eggs which are badly deteriorated and should never find their way into the market egg basket.

Homemade egg candlers may be easily and cheaply made by using any light that is strong enough for the purpose. An electric light is best, but a good kerosene lamp, a gas flame, or sunlight may be used. One of the simplest and most satisfactory homemade devices consists of a length of stovepipe with an electric light or kerosene lamp set inside. A round hole $1\frac{1}{4}$ inches in diameter should be cut in the stovepipe directly on a level with the light. (Fig. 8.) A tin can (having a removable top) large enough to take an incandescent

lamp, with a $1\frac{1}{4}$ -inch hole in the side of the can opposite the light filament, is another satisfactory homemade device where electric light is available. (Fig. 9.)

In candling, the eggs are held in a slanting position with the large end against the hole through which the light passes. The egg is grasped by the small end, and while held between the thumb and the tips of the first two fingers, it is given one or two quick turns on its long axis. (Fig. 10.) This moves the contents of the egg and throws the yolk nearer the shell, allowing its condition to be more carefully observed.

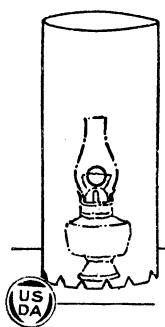


FIG. 8.—A length of stovepipe and a lamp or electric light are easily converted into an egg candle

The egg must be turned so that all sides are exposed to the candler's view. Otherwise the only evidence of an undesirable condition might occur in that portion not observed by the candler. In that case the egg would be misgraded. For the same reason, as little of the egg as possible should be obscured by the thumb and fingers holding it. The dark color of the shells of brown eggs makes them more difficult to candle than are white eggs. It is not necessary for producers to have extensive and detailed knowledge of candling. They should be able to distinguish a fresh egg from a stale egg

and to detect undesirable qualities. In a fresh egg the air space is small, measuring not over one-eighth of an inch in depth. The yolk is dimly visible, possesses limited freedom of motion, and shows no visible germ spot. The white is firm and clear and absolutely free of floating solid particles like meat spots or blood clots. (Fig. 11, A.)

In a stale egg the air space is larger, and it may have an irregular movable lower outline. The yolk is plainly visible and moves freely. The white is thin and clear. (Fig. 11, C.)

In a heated egg the germ spot is developed, and the air space is usually enlarged although it may still be comparatively small. The yolk is usually above the middle of the egg, is plainly visible, has a distinct reddish glow, moves freely, and has a visible germinal spot. (Fig. 11, B.) If a blood ring or blood veins are visible the egg is inedible. The white is thin and clear. Stale and heated eggs are of very poor quality.

A bloody white may be present in fresh eggs. Before the candle it may be distinguished by the red color of the white and often by the irregular-shaped bodies or blood clots floating in the white or on the surface of the yolk.

Foreign material shows as dark-colored particles in the white. Blood rings or veins indicate that the embryo has developed to the point where blood appears. If the embryo or germ has died the blood will have collected in a ring or circle known as a blood ring. (Fig. 12, A.) Such eggs are common during hot weather if fresh fertile eggs are held at ordinary room temperatures for any considerable period of time. Eggs showing blood rings are inedible.

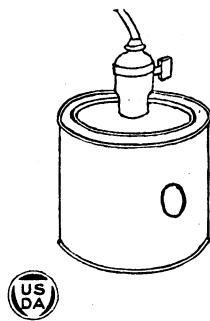


FIG. 9.—An electric light and a tin can with removable top make a cheap and easily constructed egg candle

Various other classes of eggs are unsuitable for food, such as stuck yolks, moldy eggs, and rots. (Fig. 12, B and C.) Most of these are easily distinguished from fresh eggs and are of interest to the producer only for the reason that they should be eliminated from the eggs sent to market. Eggs sometimes have minute cracks or blind checks that are invisible to the naked eye but are apparent before the candle. These should not be included with the market eggs but should be used at home, as they will not keep well and are easily broken.

All handlers of eggs, from the producers to the city jobbers, should satisfy themselves of the quality of the eggs which they buy, or which they offer for sale. This can be accomplished only by candling. In commercial packing plants the candling should be done by expert candlers in rooms maintained at a temperature not over 65° F. The "candle" used should consist of an electric-light bulb inclosed in a metal shield which may have one or two holes or spouts against which the eggs are held.

The expert operator stands before the light which is fastened at a convenient height, usually 38 to 44 inches from the floor. He handles the eggs very rapidly. At his side, or directly in front, on a shelf 22 to 26 inches high, is placed the case of eggs to be candled. After removing the top padding and flat, the candler lifts the first filler out of the case, leaving the eggs lying loose on the next flat. He picks up the eggs, two in each hand. After candling one egg in each hand, by a quick manipulation of the thumb and finger he reverses the position of the eggs and candles the other egg. (Fig. 10.) As the eggs are candled their quality is ascertained, and each is placed in the proper case for that grade. In repacking the eggs new fillers and flats are used, supplies of which are kept on a shelf above the light. The average candler, working at a steady pace but without undue effort, candles close to 25 or more cases of eggs in a 10-hour working day, which is an average rate of 15 eggs per minute. Storage eggs and others of uncertain quality are usually recandled in the final distributing and consuming markets before they are offered to the retail trade.

In learning to candle eggs the eye must be trained to look for certain things and to note them quickly. The points to be observed are condition of shell, density and mobility of yolk, weakness and

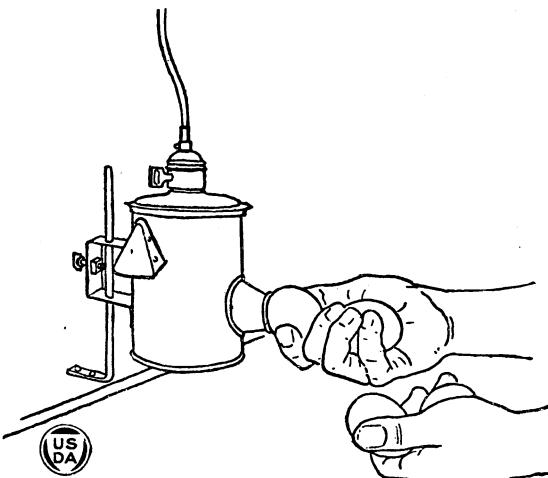


FIG. 10.—There is a best way to hold and handle eggs while candling

clearness of white, visibility and size of germ, and size, position, and outline of air cell. Frequent checking of the candler's judgment by breaking out eggs, particularly those about which there is doubt,

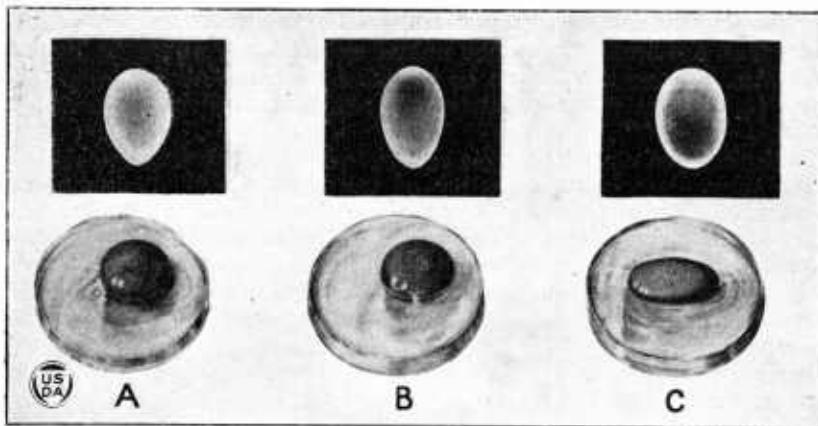


FIG. 11.—The common classes of edible eggs show differences, both before the candle and when broken out, which serve to distinguish them readily. A, fresh egg, with strong, well-rounded yolk; B, heated egg, showing germ development; C, stale egg, having weak, flattened yolk

will prove very instructive and will aid the beginner to acquire confidence and skill.

GRADING

Grading of eggs is merely a process of sorting them according to quality and of packing each quality in separate containers.

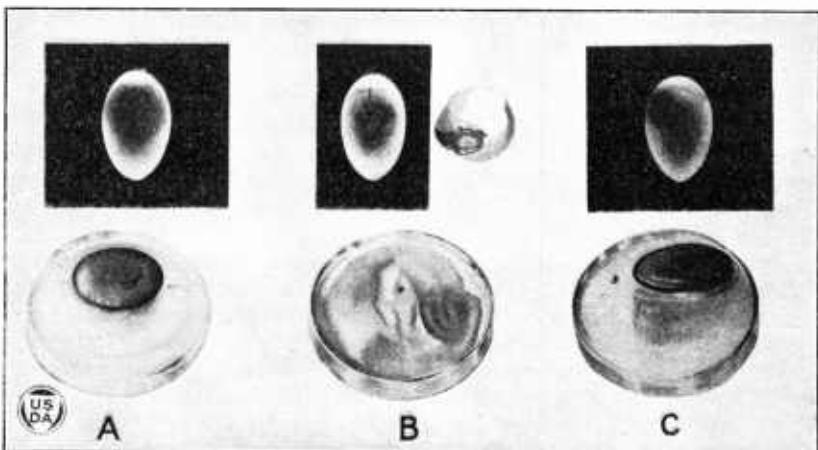


FIG. 12.—These are common types of inedible eggs distinguishable before the candle. A, blood ring; B, moldy cracked egg; C, egg with yolk beginning to adhere to shell

The grading of eggs by producers is simple and should never be neglected. It consists of discarding all eggs which are unsuitable for food, and of sorting out those which, by reason of their small or large size or dirty or cracked condition, are unsuitable for market

but which, when wholesome, should be retained for home consumption or for sale to local retail trade. If every farmer practiced this simple method of grading, much of the trouble and loss involved in the handling of eggs commercially would be eliminated, and the general quality of the market egg would be improved.

In the regular commercial channels, eggs are graded at the point where they are packed for shipment to market, which usually is at the packing plant. In many instances this is the first time they are graded. Candling, grading, and packing are done in a single operation. As the condition and quality of the egg are ascertained by candling and its grade is determined it is packed in the case assigned to that particular grade. Grading on a commercial scale is usually done before an electric light.

Occasionally when eggs are graded for a particularly fancy trade they are taken into the daylight for grading, after they have been candled, in order to secure the highest possible degree of uniformity in color and cleanliness.

When disputes arise in the large markets about the grade of a lot of eggs, official inspectors, who are available for this purpose, make inspection and certify the grade. Certain standard fees are charged for this service.

COMMERCIAL GRADES

When eggs are received at the various markets their quality may vary widely as a result of the conditions under which they have been produced and handled. To provide a practical basis for reporting prices and for the conduct of trading, it is necessary to establish certain standards based on commercial quality, and to grade according to these standards. At the present time each market has its own grades, and the result is that there is a decided lack of uniformity throughout the country. A grade name in one market may not signify the same quality as in another market. For example, according to the official Chicago market grades, the second grade of Fresh Gathered eggs is called Fresh Gathered Firsts, whereas Firsts constitute the third grade of Fresh eggs as defined by the New York Mercantile Exchange. Such a lack of uniformity in grades causes more or less confusion and uncertainty, especially in trading between widely separated markets and in comparing market quotations of different markets.

Results of the use of uniform grades in the marketing of many other agricultural products seem to indicate that the use of uniform grades in the egg trade would tend to promote a more perfect reflection of true values in all markets, would stimulate a freer trade between distant markets, and would help to create confidence and to eliminate confusion in marketing.

The United States Department of Agriculture has given this question of egg standardization considerable study. As a result it has formulated standards of quality applicable to individual eggs. With the standards of quality as a basis it has also formulated three sets of egg grades, known as United States buying grades, United States wholesale grades, and United States retail grades. The buying grades are intended for use at country points where eggs are purchased from producers. The wholesale grades are intended for

use in wholesale channels of trade, and the retail grades for use in connection with eggs ready for sale to consumers. The United States standards and grades for eggs are intended for uniform application throughout the country and when so used will provide a greatly needed common language of quality for eggs, and should prove to be an important factor in improving marketing conditions.

In most markets, eggs are divided into two general classes based upon freshness: Fresh, or Fresh Gathered, and Refrigerator, or Storage. Fresh eggs are those which are not required to be sold under some other class designation, such as Refrigerator. Refrigerator eggs are those which have been in cold storage under conditions which require them to be branded and sold as cold-storage or refrigerator eggs.

In some markets a separate class is made of processed eggs, that is, eggs which have been subjected to some artificial preserving process other than cold storage. (See p. 29.) In some markets a separate class is also made of short-held or held-fresh eggs. These are eggs which have not been subjected to any artificial preserving process and which have not been in cold storage a sufficient length of time to require their sale as refrigerator eggs but which may not have reached the market promptly or may have been held under moderate refrigeration for a short time and therefore do not conform to the requirements for either Fresh Gathered eggs or Storage eggs.

In addition to the division into classes, a division is also made on the basis of method of packing. "Storage packed" eggs are those which are packed especially for storage, in new cases made of odorless whitewood with new fillers and flats, weighing $3\frac{1}{2}$ pounds or more to the set. Other packs are recognized, including eggs "in shipping cases," which may allow the use of good secondhand cases but which should always require new fillers and flats of medium grade or better.

The various classes of eggs are further divided into grades based upon quality. The highest grade is composed of eggs of the best quality, other grades being successively lower according to the lower quality of the eggs of which they are composed. Subgrades such as Mediums and Pullets, based upon the net weight of the eggs per case, are often recognized.

Duck, goose, and guinea eggs are received on some markets in considerable quantities. Duck eggs are usually quoted separately with differences in their quality reflected by different prices. Sometimes duck eggs are quoted according to the point of origin, as "duck eggs, southern" and "duck eggs, western."

Goose eggs are received in much more limited quantities, and are quoted in a single grade. The price quotation depends upon their condition and the supply.

Guinea eggs are not often quoted as such. They are more likely to be received mixed with hen eggs, particularly in the South, and are often marketed in one of the lower grades of hen eggs.

As an example of commercial egg grades in common use three wholesale grades of the New York Mercantile Exchange are defined below:

Extras shall be of uniformly good size, free from dirty eggs (except an average tolerance of not more than 1 dozen slightly stained to the case); free from

visible germ development and of sound shells, except in the loss, and shall conform to the following quality specifications:

Clean, reasonably full, strong bodied, sweet eggs, 80 per cent. The balance, other than the loss, may be slightly defective in strength or fullness, or in cleanliness to the extent of the tolerance, but must be sweet.

The maximum average total loss shall not exceed 1¼ dozen to the case, including a maximum of four bad eggs.

Minimum average net weight 45 pounds per case.

Storage Packed Extra Firsts shall conform to the specifications for Extra Firsts except as follows:

The average tolerance for stained or slightly dirty eggs shall not exceed 2 dozen to the case.

The minimum of clean, reasonably full, strong bodied, sweet eggs shall be 80 per cent.

The maximum average total loss 1¼ dozen to the case, of which not more than four eggs may be bad or 1 dozen cracked.

Minimum average net weight 45 pounds per case.

Refrigerator Firsts shall, in grading, cases, and packing have the appearance of having been, at the time of storage, not below the specifications for Storage Packed Firsts.

They shall be sweet and free from mildew, or foreign taste, or odor.

The minimum of clean, reasonably full, strong bodied, sweet eggs shall be 65 per cent.

The maximum average total loss shall not exceed 2 dozen to the case, of which not more than 1 dozen may be bad.

Minimum average net weight 43 pounds per case.

In defining loss the Mercantile Exchange states:

Loss, as usual, shall comprise all rotten, broken (leaking), spots, broken yolked, frozen (split), hatched (blood-veined), and sour eggs. Very small, very dirty, cracked (not leaking), badly heated, badly shrunken, salted, and chilled eggs shall be counted one-third loss except very dirty eggs when inspecting Dirties and cracked (not leaking) when inspecting Checks.

EGG PACKAGES

THE CARTON

The smallest unit package used for eggs is the carton. It is a pasteboard package with a capacity of 1 dozen eggs and is used very generally by retail trade. Cartons are made in two styles, one known as the "3 by 4," holding three rows of four eggs each, and the other as the "2 by 6," holding two rows of six eggs each. Those of the latter style are much more commonly used and will pack in ordinary 30-dozen egg cases. The carton is equipped with a filler similar to that used in the regulation egg case. Cartons holding one-half dozen eggs are also used to some extent.

Carton packages are not used by producers unless they are selling direct to the consumer. As a rule, it is not wise to ship eggs packed in cartons, for if an egg is broken the entire package is spoiled and has to be repacked. When an exceptionally high-class retail trade is catered to, each egg in the carton is sometimes wrapped in waxed paper. If an egg becomes broken, this wrapping retains the contents and does not allow it to soil other eggs in the carton.

THE EGG CASE

The producer who ships his eggs generally uses the standard 30-dozen case which is used by packers. Cases used by producers are often secondhand, but those used by dealers or packers should always be new. The 30-dozen case is manufactured by firms that

specialize in this business. They are shipped knocked down and are put together in the packing plants where they are used.

The standard 30-dozen case has the following dimensions: Outside, $25\frac{1}{8}$ inches long, $12\frac{1}{8}$ inches wide, and $12\frac{7}{8}$ inches deep; inside, 24 inches long, $11\frac{3}{4}$ inches wide, and $12\frac{1}{2}$ inches deep. It is constructed of hardwood with a partition in the center extending from side to side and dividing the case into two equal square compartments with a capacity of 15 dozen eggs each. The cases are made as light as possible while still having the requisite strength. The sides, top, and bottom must be not less than three-sixteenths inch in thickness and of not more than two pieces each. Center partition and ends must be not less than seven-sixteenths inch in thickness and of not more than two pieces each. It is important that the center partition be in the true center of the case so that the two compart-

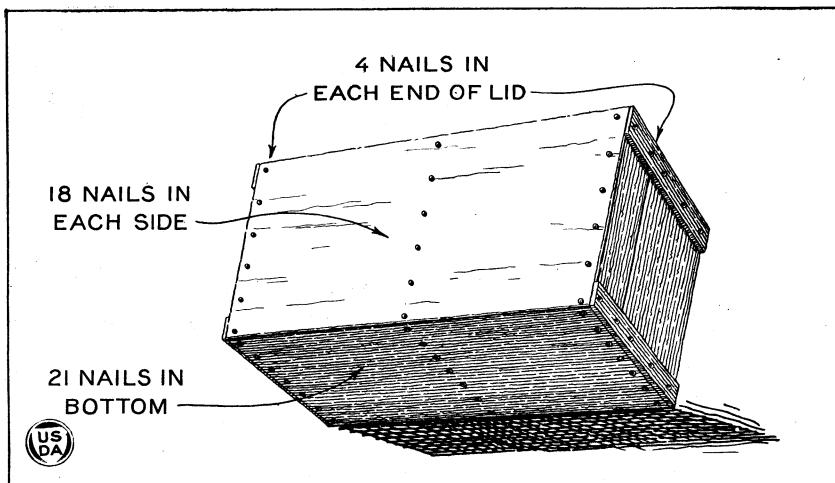


FIG. 13.—A properly constructed egg case must be well nailed

ments will be of equal and proper size and the eggs and packing will have neither too little nor too much room.

In nailing the cases together 3-penny cement-coated large-headed nails are used as follows: For a flush-cleat case, 18 on the side (6 in each end and 6 in the center), 21 on the bottom (7 in each end and 7 in the center), 8 on the top (4 in each end and none in the center). (Fig. 13.) Each case must be equipped with fillers and flats; pads also may be used. Shipping cases of various other styles and different capacities are manufactured, but they are used only to a limited extent.

FILLERS AND FLATS

The ordinary filler is $2\frac{1}{4}$ inches deep, is made of strawboard and contains 36 square cells arranged in a square with 6 on a side. Five fillers, each holding 3 dozen eggs, are used in each side of the case, or 10 fillers in all. Fillers of this style are commonly called honeycomb fillers.

When duck eggs are shipped in regulation 30-dozen cases a special filler is used. These are exactly like the standard filler in construc-

tion, except that the cells are larger and there are only 25 cells to a filler instead of 36. Fillers slightly deeper than standard are also manufactured and are used to a limited extent in shipping extra large or extra long eggs.

Solid spruce-pulp fillers and especially treated-strawboard fillers are in considerable favor for use in packing eggs to be placed in cold storage, because, being odorless, they help to prevent the development of the characteristic flavor of cold-storage eggs.

The strawboard used in fillers and flats should be of good weight, hard-calendared in finish, and perfectly dry. Strawboard fillers weaken from use and, though they may appear to be in good condition, should not be used the second time. The usual flats are merely square pieces of strawboard, the size of the egg-case compartment, and are used between the fillers. From 6 to 12 flats are required to the case, depending upon the method of packing. Wherever excelsior pads are used the flat is usually omitted between the filler and pad.

Two grades of strawboard fillers and flats are in common use. They have the following specified weights per set: $3\frac{1}{2}$ pound, $3\frac{1}{2}$ pounds per set; and No. 1, $3\frac{3}{4}$ to 4 pounds per set. Fillers of lighter weight are manufactured to some extent and were formerly commonly used, but because they do not give as good results, their manufacture and use have been largely discontinued.

Improved methods of packing to reduce breakage have brought excelsior pads into extensive use. These pads are about one-third of an inch thick and are made of excelsior wrapped with paper. They are the size of the egg-case compartment and, for best results, six of them are used to the case. Cup flats and various types of corrugated or cushion flats have also been devised and are successfully and extensively used.

PARCEL-POST PACKAGES

Parcel-post packages must be substantial in order to protect the eggs properly; at the same time they must be as light as possible to reduce postage costs. Special parcel-post packages are made in various sizes with capacities varying from one to several dozen eggs. If the packages are not likely to be returned to the shipper, the cheaper styles made of corrugated pasteboard are most commonly used. If the packages are to be returned, more substantial types, often made of metal, are common. (Fig. 14.) The ordinary 30-dozen case, when in good condition and properly packed, is also receivable by the postal authorities for the parcel-post shipment of eggs and is used to a considerable extent.

PACKING EGGS

The purpose in packing eggs is to furnish a convenient means of handling them, and to prevent breakage during shipment. Too often farmers or egg producers pack their eggs carelessly. The postal requirements for mailing market eggs are as follows:

Eggs shall be accepted for mailing when packed in crates, boxes, baskets, or other suitable containers so constructed as properly to protect the contents. Such packages must be transported outside of mail bags. All parcels containing eggs shall be plainly marked "Eggs." When necessary, they should be marked "This side up."

When the eggs are mailed in special parcel-post packages they must be carefully packed by wrapping each egg in paper, or by other means, so that they will not shake or shift around in the package. Failure to do this is almost sure to result in breakage.

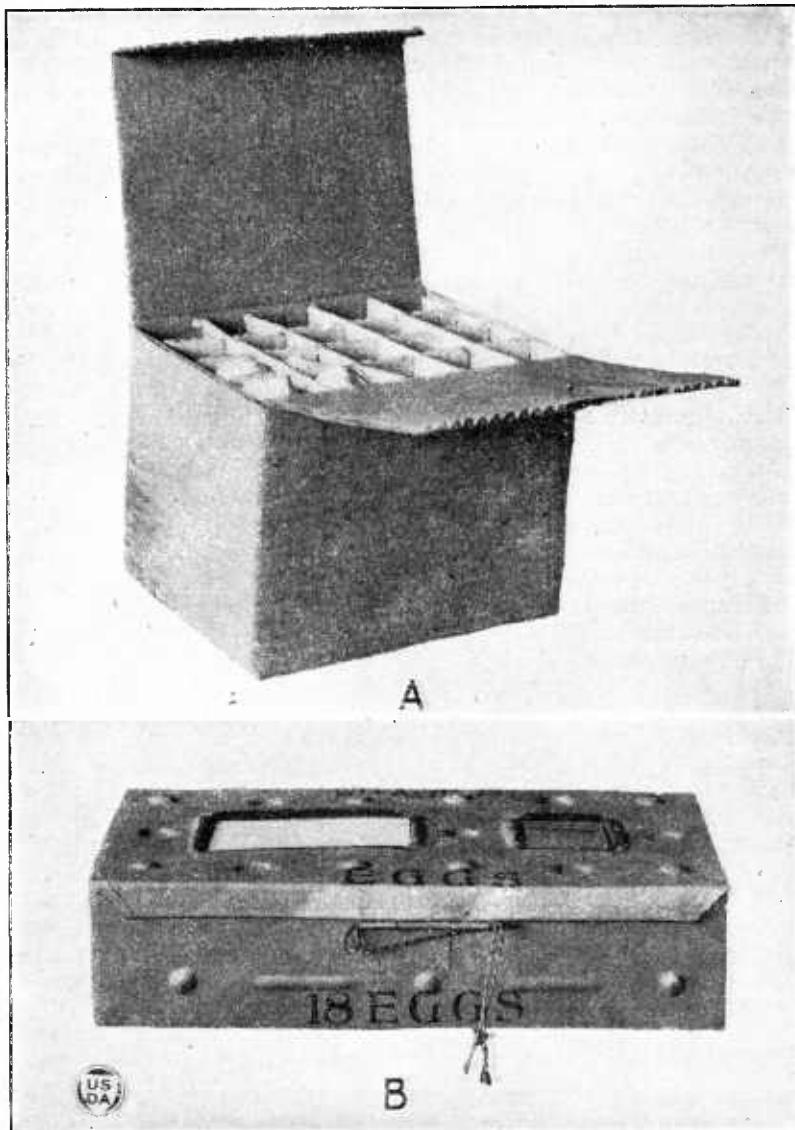


FIG. 14.—Shipment of eggs by parcel post requires strong, light containers. A, corrugated pasteboard container; B, metal container

If secondhand 30-dozen cases are used, either for parcel-post or express shipment, they must be gone over thoroughly to see that they are in good condition and properly nailed. Old fillers and flats, even though apparently in good condition, should never be used as

they will not protect the eggs properly. The express classification also specifies that secondhand cases must be strapped with wire or flat metal bands which must extend over the sides and bottom at each end; but not over the top.

To wire a secondhand case properly, first drive a nail in the side of the end board near the top, leaving enough of the nail exposed to make it possible to wrap the wire around it. Wind the wire around the nail and then carry it down the side, winding it around another nail near the center and around a third near the bottom. Continue it across the bottom and up the other side, winding it around three nails on each surface. After winding the wire around the nails drive them home, thus securely fastening the wire.

There are several generally used methods of packing eggs in the cases. An essential characteristic of a good pack is that it be a tight pack which holds the fillers securely in place and prevents

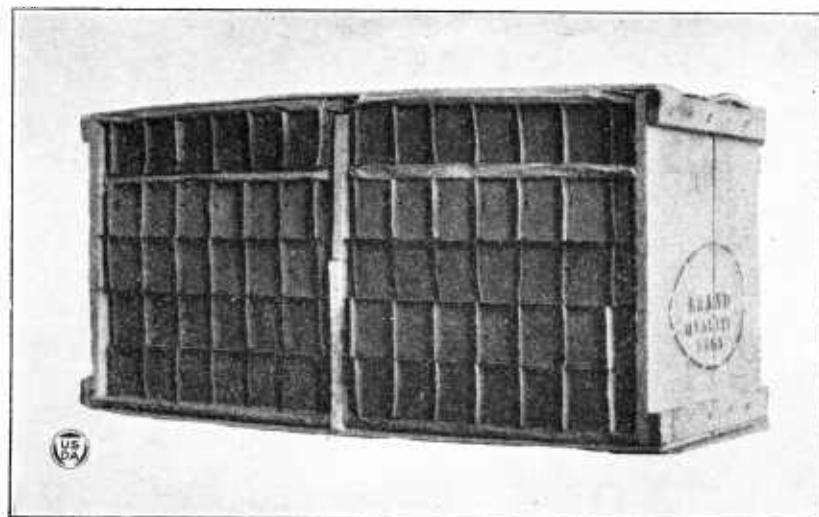


FIG. 15.—An egg case packed with standard fillers and flats and with three excelsior pads to a side is a very satisfactory method of packing. If pads are used, flats are omitted

them from shifting over the flats. Where excelsior pads are used, either four or six may be placed in each case. In the four-pad pack, a pad is placed in the bottom of each side of the case and one on top of the top filler. In the six-pad pack, pads are used exactly as in the four-pad pack and in addition a pad is placed under the top filler. Wherever pads are used, the flats should be omitted. The six-pad pack is generally considered superior to the four-pad pack in preventing breakage. (Fig. 15.)

A new type of flat known as the cup flat, which has been devised and is in rather general use, is giving excellent results in preventing egg breakage. Two of these flats placed back to back with cups facing out are used in the bottom of each side of the case and either one or two flats are used on top as padding. Ordinarily no excelsior pads are used with this pack although the two methods of packing may be combined. The fillers fit down between the cups and are

prevented by them from sliding or shifting over the flats. (Fig. 16.) Other types of embossed or corrugated flats have been developed to lessen egg breakage.

When long eggs are packed in extra-deep fillers to prevent end crush, it is desirable to deepen the cases to relieve the pressure on the eggs. This can be accomplished by nailing 1-inch strips on top of the ends and centerboards. Eggs should always be packed in the fillers, small end down, as they carry better in transit and in storage when in that position.

After packing is completed, the top is nailed on with the number of nails indicated in Figure 13. Care must be taken not to nail the cover at the center. The packing will cause a slight bulge at the center of the top which provides some elasticity and is useful in helping to absorb shipping shocks. The case must be plainly labeled

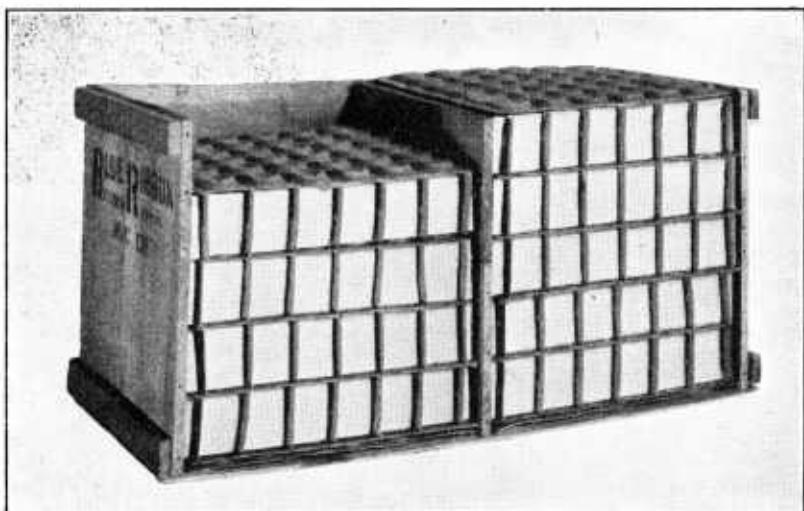


FIG. 16.—An egg case packed with white spruce fillers and cup flats makes an attractive package, protects the eggs well from breakage, and is a good package for cold storage because of the odorless character of the packing materials.

with the name and address of the person to whom it is shipped and have on it the name and address of the shipper. Tags or labels containing this information should be pasted or nailed on each end of the case rather than on the top, as on the end they are protected by the end cleats.

At the packing house the cases are assembled from the knockdown stock on forms used for this purpose. New flats and fillers should always be used. The eggs are packed at the same time that they are handled and graded, being placed in the final shipping cases by the candler. The packing is then completed by other hands. If eggs are shipped in earload lots, it is not necessary to place the name and address of the consignee on each case. Progressive egg packers and cooperative producers' organizations who wish to establish reputations for high-class brands find it to their advantage to stencil their brands on the ends of the cases.

SHIPPING EGGS

BY PARCEL POST

Parcel-post shipment of market eggs is largely a retail proposition utilized by producers who furnish eggs at regular intervals in comparatively small lots to individual consumers, but cases of eggs are shipped by parcel post from producers and from country shippers to wholesale dealers and retailers. In cases of emergency, when express and freight shipping facilities are tied up, case shipments by parcel post may be widely used. Parcel-post shipment of market eggs is generally limited to shipments within the second zone, for it does not pay, as a rule, to ship eggs long distances by this method. Both because the weight of the container is greater per dozen eggs in a small package than in a larger one and because the postage charge for the initial pound is greater than for each subsequent pound, it is more economical to ship eggs by parcel post in lots of more than 1 dozen.

The postage rate is the same to all points within the first and second zones, or, in other words, within a radius of 150 miles from the sending post office. The rate is 7 cents for the first pound and 1 cent for each additional pound. A simple method of determining the postage on a parcel not going beyond the second zone is to add 6 to the number of pounds which it weighs, the resultant sum being the amount of postage required in cents. Local parcel-post rates are in force which apply to parcels that do not go beyond the jurisdiction of the mailing office and which are lower than the rates for the first and second zones. These rates are 7 cents for the first pound and 1 cent for each additional 2 pounds or fraction thereof. Since few parcel-post shipments of eggs originate and end within the jurisdiction of the same office, producers can not often take advantage of these local rates.

Parcel-post shipments of eggs may be insured against loss or breakage, like other merchandise, and it is usually desirable to insure them. Insured packages are likely to receive more careful handling than those not insured; it is of more importance to the shipper to have the eggs go through without breakage than it is to be able to recover for damage.

BY EXPRESS

Shipments by express are usually in lots of one or several cases. There is an advantage in shipping two or more cases at once since this enables the shipper to take advantage of the hundred-pound rate, which is somewhat lower. Because it is more expensive to ship by this means than by freight, express is commonly employed for comparatively short distances. In shipping by express the requirements of the express companies must be carefully studied and complied with; otherwise claims for loss and damage will not be allowed. When express shipments may be made either by day or night, it is preferable to ship at night, especially during the hot weather, since the night temperatures are more favorable to good quality in the eggs. Whether shipping by express or freight, shippers should be careful to see that the eggs are not left on the station platform for several hours, exposed to the hot summer sun, while waiting for the

train. Such treatment will cause a serious deterioration, particularly in fertile eggs, for the hot temperature is very likely to cause development of the embryo. The eggs should be placed under cover where they will be protected from both sun and rain.

BY FREIGHT

Shipments by freight are usually of two kinds, the local pick-up freight and the through car-lot shipment. The pick-up freight service takes the eggs from the small points in comparatively small lots and delivers them at the packing house or other concentrating point. At this point, after they have been candled, graded, and repacked, they are ready for shipment to their final market. Such a shipment should be made, whenever possible, in car lots in refrigerator cars. The cases of eggs should be thoroughly chilled before they are loaded into the car. The car should be iced, except during cool weather,

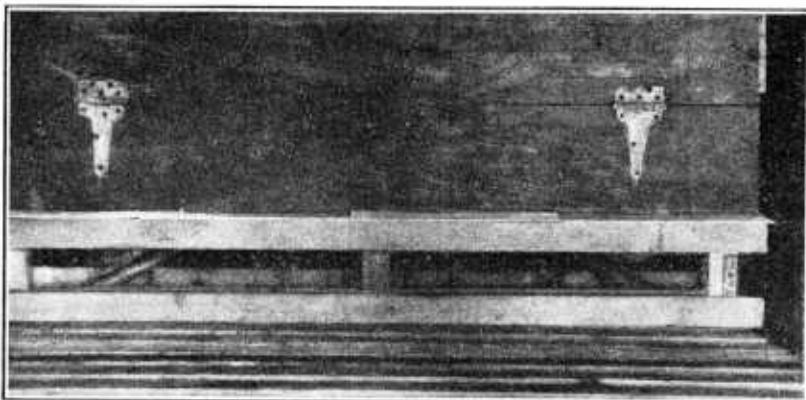


FIG. 17.—Frame constructed of 2 by 4's in position on floor of car in front of opening into ice bunker. The straw buffering at the end of the car is placed on top of this frame between the ends of the cases and the bunker wall. Note the strips of egg-case lids nailed on top of frame to keep straw from falling down and blocking bunker opening.

crushed ice without salt being used. The temperature should be reduced below 40° F. before loading is begun.

When the door is opened for loading, a canvas with a slit in it to allow the passage of the men with the cases should be hung over the door. This will help to retain the cool air and to prevent an undue rise of temperature. The egg cases are loaded in rows lengthwise in the car. The usual refrigerator car will accommodate 13 to 15 cases placed end to end lengthwise and 8 rows across. The car is usually loaded not more than 4 layers deep. Shifting of the load is one of the most serious causes of egg breakage in car-lot shipments.

To prevent shifting, a great deal of care must be taken to see that the cases are loaded tightly against one another and against the ice bunkers at the ends of the car. If it is necessary or desirable to use any buffering at the ends of the car this must be made tight between the cases and the bunker wall. If straw is used for buffering at this point a frame constructed of 2 by 4's, the height of one case, must be placed on the floor rack tight against the opening at the bottom of the bunker. Strips of egg-case lids should be nailed on top of the

frame to prevent the straw used as buffering from falling down and blocking the opening into the bunker and thus cutting off air circulation. (Fig. 17.) On top of the frame a cushion of straw of the same thickness as the frame, taken from the bale in layers, should be placed between the cases and the ice-bunker wall, the extra height of the cases, and packed tight. The load should be so planned that all or a part of the excess space occurs at the center of the car and this space should be tightly buffered with straw in the same way as that at the ends, except that no frame is used at the bottom. (Fig. 18.)

Instead of straw, wooden frames can be used for buffering. If used at the ends of the car, they are placed tight against the bunker wall, and the cases are placed tight against them. At the center they should be used in the space left between the ends of the cases, one or more frames being faced against the cases forming each end of the load. The frames are then made tight by driving additional frames or wooden braces between them to take up all slack. Floor or provision racks, with which their refrigerator cars are equipped, are commonly used by the meat-packing companies to brace egg shipments. (Fig. 19.)

Recently frames for bracing have come into use which are built in the form of wedges. In using these to fill the space at the center of the load, one wedge-shaped frame is inverted so that its point is down. This is forced down as tightly as possible and, since the load gives and tends to shift in transit, the frame keeps working lower and takes up the space gained, thus keeping the load tight. Frames of this nature are claimed to be giving excellent satisfaction.

If the car is loaded with an incomplete top layer, the cases of the next lower layer at the end, and along the side of this incomplete layer, should be raised 2 or 3 inches by means of frames set under them. The projecting top edges of these cases will then engage the lower edges of the cases in the incomplete layer and in this way will hold them firmly in place and prevent shifting. (Fig. 18.)

Four hundred cases is generally considered a carload of eggs, although the number actually stowed in a car may be somewhat more or less. Refrigerator cars, as they proceed on their way to market, are reiced en route (as may be necessary or in accordance

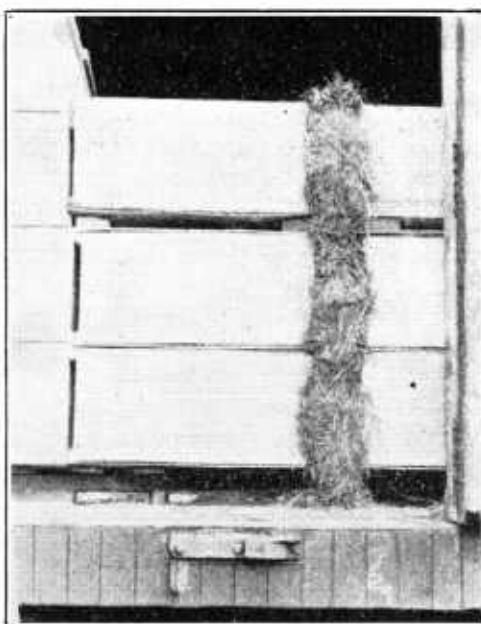


FIG. 18.—Straw buffering in position between cases at center of the car when load is completed. Note the braces made of 2 by 4's in place under the top cases of the tiers, three cases high, and how these raise the cases so as to lock in position the top cases on the adjoining tier four cases high

with the shipper's instructions) at icing stations maintained by the railroad companies. The insulation of the refrigerator car not only makes it possible to maintain a low temperature in the summer months by using ice, but also when the cars are used without ice in the winter protects the eggs from chilling or freezing during periods of severe weather.

It is decidedly preferable to ship eggs in car lots unmixed with other produce. It sometimes becomes necessary, however, to ship a partial car of eggs together with tubs of butter or with boxes

or barrels of dressed poultry. Under these conditions, it is necessary to brace the different parts of the load separately and very strongly to prevent damage to the eggs. When dressed poultry is shipped with eggs, it is best to load the packages of poultry at the ends of the car next to the ice bunkers and to load the cases of eggs at the center of the car and toward the top of the load. When this is done, the ice used in the bunkers may be salted to produce lower temperatures at the ends of the car and along the flood where the dressed poultry is located. If the ice is salted and the positions of the produce in the load are reversed, eggs next to the bunkers may be frozen, and the poultry at

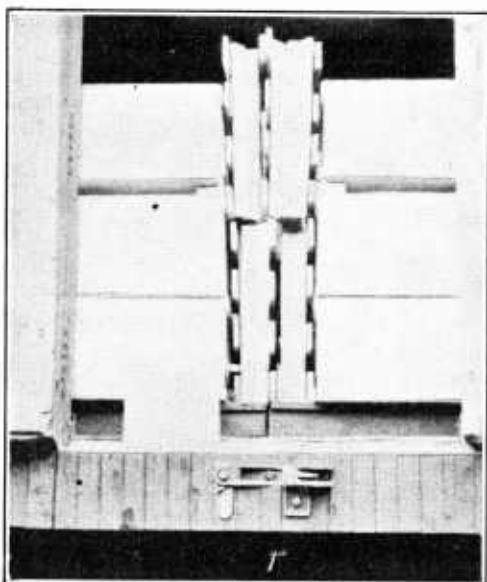


FIG. 19.—Provision of floor racks in position between cases at center of car. Eight racks were used in this position in this car and were made absolutely tight by wedging pieces of board between them

the center of the car may be damaged because of too high temperature at that point.

PRESERVATION AND COLD STORAGE OF EGGS

HOME PRESERVATION

For household use, various methods of preservation are employed. Chief among them are the water-glass method and the limewater method. The only use which producers should make of these methods of preservation is to carry a supply of cheaper eggs over the summer for home use in the fall so that all of the higher-priced fresh eggs produced at that time can be sold. Preserved eggs should never be offered for sale by the producer as anything except preserved eggs.

COLD STORAGE

The principal commercial method of preserving eggs is cold storage. Eggs which are intended for storage should be carefully

candled to remove low-quality eggs, cracks, and dirties, and should be packed in new cases made of odorless wood and in new odorless fillers of $3\frac{1}{2}$ -pound weight of better.

Storage rooms for eggs must be utilized for this purpose exclusively. Other products can not be stored with eggs on account of the danger of imparting undesirable flavors or odors to the eggs. The temperature of an egg-storage room should be maintained within a range of 29° to 32° F.; 30° is the temperature most commonly used. It is important that the temperature be held as even as possible. The humidity should range from 82 to 85 per cent, although slightly higher humidities are now being used, especially where it is possible to secure a good circulation of the air in the storage room. The cases are stacked one upon another, strips being used between to allow free circulation of air. The room itself must be kept in a sweet, clean condition. This can be accomplished by liming the floors and by whitewashing the walls after each storage season.

There are various State regulations with reference to the cold storage of eggs. Most of them have to do with the length of time that eggs may be kept in storage, the length of time they may be temporarily held in storage without being termed storage eggs (usually 30 days or less), the marking of cases with the date on which they went into storage and the date when withdrawn, and the sale of cold-storage eggs only as such.

PROCESSING

In recent years a preserving method termed "processing" or "sterilizing" has been perfected, and some market eggs are treated by it. This process consists of dipping the eggs for a few seconds into a solution of odorless, tasteless mineral oil heated to a temperature of 225 to 240 ° F., which seals the pores in the shell and thus prevents, to a large extent, the evaporation of water from the egg. Most of the processed eggs are placed in cold storage if they are to be held for any length of time. The process, therefore, is not primarily designed to replace cold storage but rather to prevent deterioration in the quality of cold-storage eggs.

FROZEN EGGS

As eggs come into the packing houses there are always a certain number which are damaged by breakage, which are dirty, or which are so weak that they will not stand shipment to market and arrive in good condition. In order to save these eggs, some establishments make a practice of breaking them out of the shell and freezing them, in which condition they can be held for a long time. Current receipts are also broken and frozen to a considerable extent when the price is low enough to make it profitable. As the eggs suitable for this purpose are located by the candlers they are placed in pails or other containers and carried to the breaking room. This room should be well lighted, provided with refrigeration, and maintained at a temperature not over 65 ° F. It must be so built and equipped that it can be kept clean and sanitary. If the bacterial content of the frozen product is to be kept at a minimum, every precaution must be taken to prevent bacterial contamination of the good eggs by any bad ones present in the breaking stock.

The eggs are broken out by operators, most of whom are girls or women. As broken, each egg is dropped into a glass cup where it can be inspected, smelled, and sometimes tasted to see that it is suitable for freezing. As soon as two or three good eggs are accumulated in a cup they are emptied into a larger container. In case a bad egg is dropped into the cup it is necessary to discard any good eggs which may be in the cup at that time. Any of the apparatus used which comes in contact with a bad egg is immediately removed to an adjoining room where it is thoroughly sterilized before being used again. The eggs, as broken, may be separated into whites and yolks or may be left in a mixed condition. As the broken eggs accumulate they are dumped into a churn where they are thoroughly agitated so as to secure a uniform mixture. They are then drawn off into their final containers, which are most commonly 30-pound cans. These cans are immediately taken to a sharp freezer where a temperature from 0° to 10° F. is maintained, and there the contents are frozen solid. The frozen eggs are held and shipped in this condition and should not be thawed until they are used. Frozen eggs are utilized principally by bakers and confectioners.

POINTS FOR THE PRODUCER TO REMEMBER IN MARKETING EGGS

Keep strong, healthy, vigorous stock and care for it properly.

Provide plenty of clean nests for the laying hens.

Gather eggs twice a day.

Keep the eggs in a cool, fairly dry place.

Keep out the cracked, dirty, small, and very large eggs for home use.

Never wash eggs unless they are to be used immediately by local trade.

Market eggs frequently, at least once a week and preferably twice.

Know the preferences of your market and strive to meet them.

Grade your eggs for uniformity in size, shape, and color.

Know the shipping requirements of express or railroad companies when you use their services.

Use only sound, strong, standard packages and pack the eggs properly.

Remember that quality is essential for best prices.

If you are selling through a satisfactory agency with which you have established a reputation for high quality, be very sure that you have secured a better outlet before you make a change.

If you sell to local dealers, insist upon their buying eggs on a "loss-off" or quality basis.

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